THE EFFECT OF AQUEOUS EXTRACT OF GINGER ON LIVER ENZYMES OF ADULT WISTAR RATS.

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ABSTRACT

This study was carried out to evaluate the effects of aqueous extract of ginger on liver enzymes of adult wistar rats. Twenty adult wistar rats of weights 190 – 215 were allocated into four groups (A, B, C & D) of five animals each. Group A served as the control and were orally administered 0.2ml of distilled water; the experimental groups B, C and D received 0.3ml, 0.6ml, and 0.9ml of aqueous extract of ginger respectively for twenty one days. The animals were weighed, sacrificed under the influence of chloroform vapour and dissected after the last administration. Liver were harvested and weighed. Blood samples were collected through cardiac puncture using sterile syringes and needles. Blood for serum preparation was collected into sterile plain tubes and stored in the refrigerator for analysis. The activities of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphotase (ALP) were determined using randox kit method. The final body weights of groups C and D decreased significantly (P < 0.05) relative to the control. The mean relative organ weight of groups C and D increased significantly (P < 0.05) when compared with the control A while group B weight was statistically similar with the control A. The activity levels of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphotase (ALP) in groups C and D increased significantly (P < 0.05) when compared with the control, while group B increased significantly (P<0.05) with the control group A. The present study suggests that consumption of ginger at high doses may cause biochemical alterations to the liver enzymes.

Key words: Liver enzymes, Liver weight, Body weight, Ginger, Wistar rats

1. INTRODUCTION

Medicinal plants have been identify and used throughout human history. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions and to defend against attack from predators. Chemical compounds in plants mediate their effect on the human body through processes identical to those already well understood for the chemical compounds in conventional drugs, thus herbal medicine do not differ greatly from conventional drugs in terms of how they work. This enables herbal medicine to be as effective as conventional medicines but also gives them the same potential to cause harmful side effects [1, 2].

The use of herbs to treat diseases is almost universal among non-industrialized societies and is often more affordable than purchasing expensive modern pharmaceuticals. The World Health Organization (WHO) estimates that 80% of the population of Asian and African countries presently use herbal medicine for some aspects of primary heath care. Studies in the United States have shown that their use is less common in clinical settings but has become increasingly more in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely available [3].

Ginger is one of these medicinal plants. It is indigenous to Southern China, from whence it spread to the Spice Islands and other parts of Asia and subsequently to West Africa [4, 5].

Mature ginger rhizomes are fibrous and nearly dry. The juice from old ginger roots is extremely potent and is often used as a spice in Indian recipes and is a quintessential ingredient of Chinese, Koreas, Japanese and many South Asian Cuisiness for
flavouring dishes such as sea food or goat meat. It also serves as useful food preservative [6, 7, 8].

Ginger has a sialogogue action stimulating the production of saliva which makes swallowing easier [9].

In India, ginger is applied as a paste to temples to relieve headache and consumed when suffering from the common cold [10].

From the predictions, and researches on side effects of medicinal plants, there is need to evaluate the effects of ginger on the liver enzymes of adult wistar rats.

2. MATERIALS AND METHODS

Breeding of Animals

Twenty wistar rats were procured from the Animal House of Department of Pharmacy, Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Agulu, Anambra State, Nigeria. They were allowed to acclimatize in the Animal House of Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus under normal temperature (27°C-30°C) for one week and fed ad-libitum with water and guinea feed pallets from Agro feed Mill Nigeria Ltd.

Drug Preparation

Fresh ginger rhizomes were bought from Onitsha market. They were dried in an oven and grinded using laboratory blender. 200mg of the grinded ginger rhizomes was dissolved in 10ml of distilled water and administered to the animals.

Experimental Protocol

The animals were divided into four groups (A, B, C & D) of five animals each. Group A served as the control and were orally administered 0.2ml of distilled water; the experiment groups were orally administered different doses of 0.3ml, 0.6ml, and 0.9ml of aqueous extract of ginger respectively for twenty one days. Immediately after the last administration, the animals were weighed, sacrificed using chloroform inhalation method and dissected. Liver were harvested and weighed. Blood for serum preparations was collected into sterile plain tubes without anti-coagulant. Serum samples were separated into sterile plain tubes and stored in the refrigerator for analysis. The activities of serum aspartate aminotransferase (AST), alanin aminotransferase (ALT) and alkaline phosphotase (ALP) were determined using randos kit method.

3. RESULTS

Morphometric Analysis of Body Weight

Table 1: Comparison of mean initial and final body and weight change in all the groups (A, B, C & D)

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>F-Ratio</th>
<th>Prob. of Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Body Weight</td>
<td>187.10±2.60</td>
<td>190.50±3.50</td>
<td>196.50±3.50</td>
<td>199.30±2.70</td>
<td>58.120</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Final Body weight</td>
<td>210.20±4.30</td>
<td>218.10±2.70</td>
<td>165.10±2.40</td>
<td>150.20±4.10</td>
<td>38.200</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Weight change</td>
<td>23.10±0.240</td>
<td>27.90±0.200</td>
<td>31.40±0.320</td>
<td>49.10±0.140</td>
<td>30.40</td>
<td>&lt;0.005</td>
</tr>
</tbody>
</table>
**Morphometric Analysis of Liver Weight**

**Table 2:** Comparison of Mean relative liver weight of all the groups (A, B, C & D)

(Mean ± SEM given for each measurement)

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>F-Ratio</th>
<th>Prob. of Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver weight</td>
<td>5.10±0.216</td>
<td>5.12±0.420</td>
<td>5.60±0.160</td>
<td>5.98±0.130</td>
<td>53.20</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>
Activities of Serum Levels of Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT) and Alkaline Phosphatase (ALP)

Table 3: Comparison of activities of serum levels of AST, ALT & ALP in all the groups (A, B, C & D).
(Mean ± SEM given for each groups)

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>F. Ratio</th>
<th>Prob of Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST</td>
<td>71.60±4.10</td>
<td>72.90±2.60</td>
<td>79.80±3.50</td>
<td>86.10±2.40</td>
<td>27.40</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>ALT</td>
<td>61.20±3.10</td>
<td>62.10±2.30</td>
<td>72.50±2.60</td>
<td>81.30±3.60</td>
<td>33.50</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>ALP</td>
<td>173.20±3.70</td>
<td>174.90±2.50</td>
<td>186.10±4.10</td>
<td>198.20±4.30</td>
<td>11.30</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

4. DISCUSSION

Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80 percent show a positive correlation between their modern therapeutic use and the traditional use of the plant from which they are derived [11]. At least 7000 medical compounds in the modern pharmacopoeia are derived from plants [12].

Ginger is one of these medicinal plants which is used in applied in Indian as a paste to the temples to relieve headache, and consumed when suffering from the common cold. Ginger with lemon and black salt is also used for nausea [13].

In the Philippines, ginger is known as luya and is used as a throat lozenge in traditional medicine to relieve sore throat. It is also brewed into a tea known as salabat [14, 15].

Unchewed fresh ginger may result in intestinal blockage, and individual who have had ulcers, inflammatory bowel disease or blocked intestines may react badly to large quantities of fresh ginger.

There are also suggestions that ginger may affect blood pressure, clotting and heart rhythms [16].

In the present study, the mean body weight results revealed decrease body weights in groups C and D treated with high doses of ginger aqueous extract while group B treated with low dose of ginger increased significantly (P<0.05) with the control group A.

The mean relative organ weight results revealed significant increase (P<0.05) in groups C and D while group B had similar values with the control group A.
The comparison of activities of serum levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) results showed that the level of aspartate aminotransferase (AST), alanine aminotransferase and alkaline phosphatase (ALP) increased significantly (P<0.05) in groups C and D when compared with the control group A while group B level of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) were statistically similar with the control group A.

The present study therefore suggests that high consumption of ginger may have side effects on the liver enzymes.

5. CONCLUSION

From the present study, we therefore inferred that high consumption of ginger may cause adverse biochemical alteration in the liver enzymes of adult wistar rat

6. REFERENCES

6. ‘’All about ginger at All things Ginger’’ Allthingsginger.co.uk. Retrieved 25 April 2012.
7. Glorious Ginger: Root out Ailments with this Ancient Spice published by thefoodpaper.com